

What is claimed is

1 1. A coil spring comprising metal wire and having an inner coil diameter, an outer
2 coil diameter, a coil pitch, a coil circumference, and a coil length along a coil axis, said
3 metal wire having a wire length, a surface, a subsurface layer, and at least one transverse
4 cross-section with two opposing coil binding contact points on said surface, said two
5 opposing coil binding contact points establishing an opposing contact axis, each said
6 transverse cross-section further having a predetermined transverse residual compressive
7 stress magnitude distribution within said wire, and said predetermined transverse residual
8 compressive stress magnitude distribution being substantially symmetrical about said
9 opposing contact axis.

1 2. The coil spring of claim 1 wherein at least one said predetermined transverse
2 residual compressive stress magnitude distribution is additionally substantially
3 symmetrical about a perpendicular bisector of said opposing contact axis, said
4 perpendicular bisector intersecting said opposing contact axis at an origin.

1 3. The coil spring of claim 1 wherein magnitudes of each said predetermined
2 transverse residual compressive stress magnitude distribution increase monotonically
3 along a portion of said opposing contact axis between said origin to said subsurface layer.

1 4. The coil spring of claim 1 wherein at least one said predetermined transverse
2 residual compressive stress magnitude distribution extends along said wire length for a
3 distance greater than said coil circumference.

1 5. A peening mask for selective peening of the coil spring of claim 1, said mask
2 comprising a cylindrical inner shield and a coiled outer shield, said cylindrical inner
3 shield having a diameter slightly less than said inner coil diameter of the coil spring of
4 claim 1 and a length not less than the coil length of the coil spring of claim 1, and said
5 coiled outer shield having an inner diameter slightly greater than said outer coil diameter

6 of the coil spring of claim 1 and said coiled outer shield having a pitch substantially equal
7 to the coil pitch of the coil spring of claim 1.

1 6. A method for selective peening of a coil spring that comprises metal wire and has
2 an inner coil spring diameter, an outer coil spring diameter, a coil spring pitch, and a coil
3 spring length along a coil spring axis, the method comprising

4 providing a peening mask for selective peening of said coil spring, said peening
5 mask comprising

6 a cylindrical inner shield having a diameter slightly less than said
7 inner coil spring diameter and a length not less than said
8 coil spring length; and

9 a coiled outer shield having an inner diameter slightly greater than
10 said outer coil spring diameter and having a pitch
11 substantially equal to said coil spring pitch; and

12 inserting said cylindrical inner shield within the coil spring to form a first
13 assembly;

14 inserting said first assembly within said coiled outer shield to form a second
15 assembly;

16 aligning said cylindrical inner shield and said coiled outer shield with the coil
17 spring; and

18 peening said second assembly.

1 7. A peening mask for selective peening of a coil spring that comprises metal wire
2 and has an inner coil spring diameter, an outer coil spring diameter, a coil spring pitch,
3 and a coil spring length along a coil spring axis, said peening mask comprising

4 a cylindrical inner shield having a diameter slightly less than said inner coil spring
5 diameter and a length not less than said coil spring length; and

6 a coiled outer shield having an inner diameter slightly greater than said outer coil
7 spring diameter and having a pitch substantially equal to said coil spring
8 pitch.